DODPOPHM/USA/DOD/NADTR93103

PERFORMANCE ORIENTED PACKAGING TESTING OF SHOCK TEST CHARGE BOOSTER CONTAINER FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

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Date
July 1993

FINAL

DISTRIBUTION UNLIMITED

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	July 1993	POP Test

4. TITLE AND SUBTITLE

Performance Oriented Packaging Testing of Shock Test Charge Booster Container for Packing Group II Solid Hazardous Materials

5. FUNDING NUMBERS

6. AUTHOR(S)

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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

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DODPOPHM/USA/DOD/NADTR93103

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

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10. SPONSORING/MONITORING AGENCY REPORT NUMBER

Same as above

11. SUPPLEMENTARY NOTES

N/A

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Unlimited distribution

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

Qualification tests were performed to determine whether the in-service MIL-B-2427 wood box used for shipping and storage of shock test charge boosters could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 28 kg (62 pounds). The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods, ST/SG/AC.10/1 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178. The MIL-B-2427 wood box has conformed to the POP performance requirements; i.e., the box successfully retained its contents throughout the specified tests.

14. SUBJECT TERMS

POP Test of MIL-B-2427 Wood Box for Shock Test Charge Boosters

15. NUMBER OF PAGES

6

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UL	UL	UL

INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the MIL-B-2427 wood box used for shipping and storage of shock test charge boosters meets the Packing Group II requirements specified by the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 31 December 1991. The objectives were to evaluate the adequacy of the container in protecting the hazardous materials.

The box tested conforms to MIL-B-2427, Type II, Class 2, Grade C and contains one booster for either a 1200 or a 10,000 pound shock test charge. One steel strap was used to secure the wood box during the tests.

TESTS PERFORMED

1. Drop Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. One container was used for each drop orientation. The drop height was 1.2 meters and the drop sequence was as follows:

a. Flat on Bottom
b. Flat on Top
c. Flat on Long Side
d. Flat on Short Side
e. One Corner

The test was performed at ambient temperature (70° $\pm$ 20°F). The contents of the container should be retained within its packaging and exhibit no damage liable to affect safety during transport.

2. Stacking Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. Three different containers were used, each with a stack weight of 500 pounds. This represents the weight imposed on the bottom container of a sixteen-foot stack of like containers weighing 62 pounds each. The test was performed for 24 hours. After the allowed time, the weight was removed and the container examined. Any leakage, deterioration, or distortion which could adversely affect transport or reduce its strength or cause instability in stacks of packages is cause for rejection.

3. Base Level Vibration Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. Three sample containers were loaded with aluminum rods and closed as for shipment. Each container was placed on a vibrating platform that had a vertical

double-amplitude (peak-to-peak displacement) of one inch. The packages were constrained horizontally to prevent them from falling off the platform, but were free to move vertically, bounce and rotate. The test was performed for one hour at a frequency that caused each point of the container bottom to be raised from the platform 1.6 mm. A 1.6 mm thick metal strip was passed between the bottom of the container and the platform.

PASS/FAIL

1. Drop Test

The criteria for passing the drop test is outlined in Title 49 CFR, Part 178, Subpart M, Sec. 178.603(f): A package is considered to successfully pass the drop test if for each sample tested, no rupture occurs which would permit spillage of loose explosive substances or articles from the outer packaging.

2. Stacking Test

The criteria for passing the stacking test is outlined in Title 49 CFR, Part 178, Subpart M, Sec. 178.606: No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation.

3. Base Level Vibration Test

The criteria for passing the Base Level Vibration Test is outlined Title 49 CFR, Part 178, Subpart M, Sec. 178.608: Immediately following the period of vibration, each package must be removed from the platform, turned on its side and observed for any evidence of leakage. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

TEST RESULTS

1. Drop Test

Satisfactory.

2. Stacking Test

Satisfactory.

3. Base Level Vibration Test

Satisfactory.

DISCUSSION

1. Drop Test

After each drop the container was inspected for any damage which would be cause for rejection. The flat drops caused no visible damage. When the box was dropped on a corner of the lid, the lid buckled and cracked across its middle along the wood grain and one nail in each lid cleat popped loose, but the lid was held intact by the steel strap. The box is shown after the corner drop in figure 1. In all drops, the container remained intact and there was no spillage of contents.

2. Stacking Test

Three containers were individually tested. Each container was visibly inspected after the 24-hour period was over. There was no leakage, distortion, or deterioration of the container as a result of this test.

3. Base Level Vibration Test

Immediately following the vibration test, each container was removed from the platform, turned on its side and observed for any evidence of leakage. All containers remained securely closed and there was no evidence of leakage of contents.

REFERENCE MATERIAL

Code of Federal Regulations Title 49 CFR, Parts 107-178.

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DATA SHEET

CONTAINER:
MIL-B-2427 Wood Box
for Shock Test Charge
Boosters

POP MARKING:
(u n) 4C1/Y28/S/**
USA/DOD/NAD

Type: 4C1

UN Code: 1.1D

Specification Number:
MIL-B-2427

Material:
Wood

Gross Weight:
28 kg
(62.0 pounds)

Dimensions:
.34m L x .20m W x .51m H
(13.44" L x 8.06" W x 20.25" H)

Closure (Method/type):
1 Steel strap
1 Hasp

Tare Weight:
5.4 kg
(12.0 pounds)

Additional Description: Outer pack drawings for these items are: 6W74: 10001-2128459
9W49: 53711-6086513

PACKAGED COMMODITY:
Booster for 10,000 Pound Shock Test Charge
6W74, 1375-01-147-9860
Booster for 1200 Pound Shock Test Charge
9W49, 1375-01-199-8304

Proper Shipping Name: 6W74- Bursters
9W49- Boosters

United Nations Number: 6W74- 0043
9W49- 0042

United Nations Packing Group: II

Physical State: Solid

Amount Per Container: 1

Net Weight: 16.0 kg (35.3 pounds)

PACKAGED COMMODITY USED FOR TEST:
Name: Aluminum rod
Physical State: Solid

Size : .45m L x .15m Dia
(18.00" L x 6.00"Dia)
Quantity : 1
Net Weight: 22.7 kg (50.0 pounds)

Dunnage: Polyethylene foam and fiberboard